



pennsylvania

DEPARTMENT OF ENVIRONMENTAL PROTECTION

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DATE December 10, 2015

RE Plan Approval Application Review –Cooling Towers
Monroe Energy, LLC
Trainer Borough, Delaware County
Application No.: 23-0003Z
APS ID: 863616, AUTH ID: 1061029

On January 30, 2015, the Department of Environmental Protection (DEP) received a Plan Approval application from Monroe Energy, LLC (Monroe) for the construction of three (3) closed loop cooling towers (CTs) at Monroe's Trainer Refinery located at 4101 Post Road in Trainer Borough, Delaware County.

Facility Information

The Trainer Refinery is a major facility located in an ozone marginal nonattainment area.

The Trainer Refinery is a major facility for PSD pollutant emissions: NO_x, CO, SO_x, PM, PM₁₀, and HAPs.

The Trainer Refinery is a major facility for nonattainment new source review (NNSR) pollutant emissions: PM_{2.5}, NO_x, and VOC.

Existing Cooling Tower Information

The Trainer Refinery has three (3) existing once-through CTs (Source ID 111 – Cooling Towers, and part of Source ID 700 – Heater Exchanger Systems):

- South side cooling tower
- Alky unit cooling tower
- Benzene unit cooling tower

These CTs take “cold” water from Delaware River, and discharge the “hot” water into Marcus Hook Creek and Stony Creek.

Project

The project is to install three (3) new closed loop recirculating cooling towers:

<i>Monroe ID</i>	<i>Name</i>	<i>Manufacturer</i>	<i>Rated Capacity</i>
CT 01	Alky Cooling Tower #2	Cooling Tower Depot, Inc.	12,050 (gal/min)
CT 02	FCC Cooling Tower	Cooling Tower Depot, Inc.	28,500 (gal/min)
CT 03	Crude Cooling Tower	To be determined	36,850 (gal/min)

A new Source ID 701 was created in the AIMS for the new Cooling Towers (Closed Loop Recirculating Heat Exchangers)

The purpose of the project is to

- Reduce the Delaware River water intake quantity and velocity;
- Decrease the temperature of the water discharged into the Marcus Hook Creek and Stony Creek; and
- Comply with Clean Water Act regulations that limit intake velocity.

The current existing water supply system to the existing CTs will be capped off, and the existing CTs will be abandoned in place. The existing water supply system will continue to supply water to the following:

- Small operations that cannot be easily tied into the new cooling towers; and
- Fire water to all areas of the Refinery in case of emergency.

The new CTs will be connected to the existing cooling water supply and return lines in each of the three (3) areas for which they are named. Each of the new CTs will be equipped with two (2) electrically-driven pumps, as well as one (1) steam-driven pump. The three (3) new proposed steam-driven pumps will use steam from existing Boiler No. 9 (Source ID 034) and/or Boiler 10 (Source ID 035).

Four (4) chemical storage tanks will be constructed next to each CT to store chemicals for the cooling tower water treatment. The chemicals are sulfuric acid (754 gallons), bleach (1,996 gallons), dispersant (1,092 gallons), and corrosion inhibitor (1,092 gallons).

Air Cleaning Devices

The new CTs will be equipped with drift eliminators with a drift rate of 0.0005% (gallons of water drifted/gallons of water circulated).

Emissions

1. The projected actual emissions (PAE) for PM from the CTs were estimated using the following equation:

$$\text{PM Emissions (lb/hr)} = \text{Water circulating rate (gal/min)} \times 60 \text{ (min/hour)} \times 8.34 \text{ (lb/gal water)} \\ \times \text{TDS* (1,400 ppmw in circulating water)} \times \text{Drift Rate (0.00005\%)}$$

*: TDS - total dissolved solids

It is assumed that PM emissions = PM10 emissions = PM2.5 emissions

2. The projected actual VOC emissions from the CTs were estimated using the method and equations specified in 40 C.F.R. §63.654(g)(4)(i) and (ii). The VOC concentration is assumed that the leak rate of 31ppmv for each CT. The 31 ppmv is half of the “delay of repair action level” (62 ppmv) as specified in 40 C.F.R. §63.654(f)(3).

Table 1 – Cooling Tower Emissions

CT ID	Water Circulating Rate (gal/min)	PM10/PM2.5 PAE		VOC PAE	
		lb/hr	TPY	lb/hr	TPY
CT 01	12,050	0.04	0.19	2.40	10.49
CT 02	28,500	0.10	0.44	5.66	24.81
CT 03	36,850	0.13	0.57	7.32	32.08
Total			1.20		67.38

3. The PAE from Boiler Nos. 9 and 10 for this project are estimated based on the amounts of additional steam required to operate each CT for 8760 hours per year. The emission factors are from 2009 stack test results, CEM data, and AP-42 1.4, respectively.

Table 2 – PAE from Boiler Nos. 9 and 10

Pollutants	Emission Factor Basis	Emissions (TPY)
PM filterable	2009 stack test data	0.13
PM10	2009 stack test data	1.67
PM2.5	2009 stack test data	1.67
SO ₂	CEM and 2009 stack test data	0.58
NO _x	2013 CEM data	1.44
VOC	2009 stack test data	0.00
CO	2013 CEM data	6.36

Table 3 - GHG Emissions

Pollutants	Emission Factors Basis	Emission Factors (lb/MMSCF)	Emissions (TPY)	CO ₂ e (TPY)
CO ₂	AP-42 Chapter 1.4 Table 1.4-2	120000	101099.08	101099.08
CH ₄		2.2	1.85	46.25
N ₂ O		2.3	1.94	578.12
CO ₂ e				101723.45

Regulatory Review

1. PSD

The project is not subject to prevention of significant deterioration (PSD), because the project itself does not create significant emission increase (SEI) for attainment pollutants shown in Table 4.

Table 4 – PSD Thresholds for Regulated Pollutants and Project PAE

PSD Pollutants	PSD SEI Thresholds (TPY)	PTE (TPY)
PM filterable	25	1.33
PM10	15	2.86
PM2.5	10	2.86
SO ₂	40	0.58
NO _x	40	1.44
CO	100	6.36

Greenhouse Gas (GHG) PSD applicability determination:

The Supreme Court ruled on GHGs on June 23, 2014. In the case of Utility Air Regulatory Group v. EPA, the Supreme Court overturned part of U.S. EPA's trigger for when new or modified sources must seek permits for their GHG emissions, holding that the agency can only impose GHG limits in permits when a facility's conventional emissions would require it. The

Court ruled that the Clean Air Act "neither compels nor permits EPA to adopt an interpretation of the Act requiring a source to obtain a PSD or Title V permit on the sole basis of its potential greenhouse-gas emissions. The court overturned EPA's "tailoring rule," which sought to amend the law's statutory thresholds. "EPA lacked authority to 'tailor' the Act's unambiguous numerical thresholds of 100 or 250 tons per year to accommodate its greenhouse-gas-inclusive interpretation of the permitting triggers," the opinion says. Instead, the court found the agency's stationary source permit program "cannot rationally be extended beyond" the largest stationary sources that trigger the permit requirements anyway for other pollutants.

Since no other pollutants trigger PSD applicability with this project, PSD for GHG is not applicable to this project at this time.

2. *NSR – 25 Pa. Code Chapter 127 Subchapter E*

- **25 Pa. Code 127.203a(a)(1) – Significant Emission Increases**

This project is subject to New Source Review (NSR) as per 25 Pa. Code §127.201(f), because the PAE of VOC is over the thresholds of significant emission rate as shown in Table 5.

Table 5 – PTE for PM2.5, NOx, and VOC

Pollutants	NOx	VOC	PM2.5
PTE (TPY)	3.4	67.38	2.86
Significant Emission Rate (TPY)	25	25	10
Trigger NNSR	No	Yes	No

- **25 Pa. Code 127.203a(a)(1) - VOC and NOx Emissions Aggregations**

Monroe offset the aggregated VOC emission increases through Plan Approval No. 23-0003W (issued on September 24, 2013). Monroe offset the aggregated NOx emission increases through Plan Approval No. 23-0003Y (issued on October 14, 2014). The aggregated VOC and NOx emission increases including this project are shown in Table 6.

Table 6 – VOC Emission Aggregations

Application Date	Plan Approval RFD	Description	Emission (tpy)	
			NOx	VOC
06/03/2013	23-0003W	D2 Project	-	Offset
10/31/2013	23-0003X	Emergency Generator	-	0.01
7/21/2014	23-0003Y	Boiler No. 13	Offset	1.98
01/30/2015	23-0003Z	Three (3) New Cooling Tower	1.44	67.38
Total Contemporaneous Emission Increases			1.44	69.37

- 25 Pa. Code 127.205(1) – LAER

A list of refinery cooling towers with process codes of 50.007 and 50.999 was generated from EPA RACT/BACT/LAER Clearinghouse (RBLC) (See attachment). From the list, the LAER or BACT or Other Case-by-Case for those refinery cooling towers were to comply with 40 C.F.R. 63 Subpart CC – monthly monitoring for VOC in cooling water. This list did not provide any information for other projects that have used VOC control devices for cooling towers.

Therefore, LAER for these new cooling towers is:

1. As per 25 Pa. Code §127.203a(a)(5)(iii)(A), VOC emissions from the following new cooling towers shall not exceed the limits, specified below, calculated monthly and 12-month rolling sum:

CT 01 - Alky Cooling Tower #2:	10.49 TPY
CT 02 - FCC Cooling Tower:	24.81 TPY
CT 03 - Crude Cooling Tower:	32.08 TPY

2. The annual average VOC concentration in the recirculating cooling water shall not exceed 31 ppmw calculated monthly and averaged on a 12-month rolling period.
3. The permittee shall monitor VOC concentration in the recirculating cooling water monthly using a leak action level defined as a total strippable hydrocarbon concentration (as methane) in the stripping gas of 6.2 ppmv.

The applicable requirements from 40 C.F.R. Part 63, Subpart CC have been placed into the plan approval for these sources. These requirements include monitoring, recordkeeping, reporting and work practice standards for identifying leaks of total strippable volatile organic compounds (VOC) from each heat exchange system.

- 25 Pa. Code 127.208 – ERC Use and Transfer

ERC use and transfer requirements were specified in the Plan Approval.

- 25 Pa. Code 127.210 – Offset Ratios

The offset ratio for VOC fugitive emissions is 1.3:1. Therefore, the required ERC for this project and previous VOC emission increases is $69.37 \times 1.3 = 90.18$ tons.

3. *MACT*

40 C.F.R. 63 Subpart CC—National Emission Standards for Hazardous Air Pollutants From Petroleum Refineries

As per §63.640(l)(1), the CTs are “added to an existing petroleum refinery”, and “are subject to the requirements for an existing source”. The applicable requirements were specified in the Plan Approval.

4. CAM

40 C.F.R. PART 64 - COMPLIANCE ASSURANCE MONITORING

The VOC emissions from CT 03 are over the major source threshold – 25 TPY. However, there is no control device to reduce VOC emissions from CT 03. Therefore, CAM does not apply to CT 03.

5. 25 Pa. Code

§123.13(c)(1)(iii) – PM Emissions

The PM emission standard in §123.13(c)(1)(iii) is 0.02 gr/dscf. The PM emissions from each CT are less than 3.5E-6 gr/dscf that meets the standard.

§127.12(a)(5) – Best Available Technology (BAT)

The PM emissions from the cooling towers are controlled by using drift eliminators that can achieve a drift rate of 0.00005%, by weight. This is considered BAT for cooling towers PM emission control.

The boilers are operating under current TVOP. Each boiler is equipped with Selective Catalytic Reduction (SCR) to achieve NOx emission limit of 0.0077lbs/MMBtu. This is considered BAT for boiler NOx emission control.

Each boiler is also equipped with CO Oxidation Catalyst to achieve 0.0195 lbs CO/MMBtu and 0.0013 lbs VOC/MMBtu. This is considered BAT for boiler CO and VOC emission control.

§129.91 through 94 – Reasonably Available Control Technology (RACT)

RACT does not apply to new sources, because new sources must comply with BAT that is no less stringent than RACT.

§129.201 – Additional NOx Requirements for Boilers

The boiler is not subject to Additional NOx Requirements for Boilers, as per 25 Pa. Code §129.201(c)(2), because the boiler is subject to 25 Pa. Code §145.8(d).

§§145.4 and 145.8 – NOx Budget Trading Program, and Transition to CAIR NOx trading programs.

The boilers are subject to NOx Budget Trading Program as per §145.4(a)(2)(iii)(A), and shall comply with 25 Pa. Code §145.8(d). The applicable requirements are stated in current TVOP No. 23-00003 for the boilers.

§127.44 – Public Notice

Notice of intent to issue this Plan Approval was published in PA Bulletin on October 24, 2015, and Delaware County Daily Times, Daily & Sunday Times Digital on October 6, 7, and 8, 2015. No comments were received by DEP.

DEP added and/or revised monitoring and recordkeeping requirements (Conditions #005 and 007 relating to PM emissions under 25 Pa. Code §127.12b to the PA.

6. Coordination

This Plan Approval is in coordination with Watershed Management/Stormwater NPDES.

Recommendation

I recommend that Plan Approval No. 23-0003Z be issued to Monroe Energy for the installation of the three cooling towers.

Attachment: LAER for Refinery Cooling Towers

Summary of Plan Approval No. 23-0003Z:

Event	Regulations	Date	Comments
Submittal of Application	NSR – LAER and Offset for VOC MACT – CC BAT	Received on 1/30/2015	Not a PDG application
Coordination	Joint Chapter 105/CWA Section 404 Stream Encroachment Permit Application No. E23-516, APS ID 869371, AUTH ID 1070889		
Acceptance of a complete application		4/23/2015	
Publication in PA Bulletin	Required	10/24/2015	
Publication in local newspaper	Required	10/6, 7, 8, 2015	
Comments from public received	No		
Comments from U.S. EPA Received	No		